

## LAMP SOCKET AND SOCKET ASSEMBLY

### BACKGROUND OF THE INVENTION

This invention relates generally to a lamp socket and  
5 a socket assembly used in an automotive lamp, and more particularly to a lamp socket, to which wires can be directly connected, and also to a socket assembly employing these lamp sockets.

10 Fig. 7 shows one example of related lamp socket used in an automotive lamp. This lamp socket 1 includes a bulb mounting portion 1a, in which a bulb 3 can be mounted, a flange portion 1b, and a connector housing 1c for fitting on a power supply connector 13. Terminal members 2 for electrical connection  
15 to the bulb 3 project into the interior of the connector housing 1c.

As a preliminary step before the mounting of the lamp socket 1, wires 7 are installed on a lamp unit body 5 as shown  
20 in Fig. 9. More specifically, the wires 7 are received respectively in connection portions 4 disposed adjacent to a socket mounting hole 6, as shown in Fig. 7, and a press-connecting terminal 8, having press-connecting blades 9, is inserted into this connection portion from the upper side, so that the  
25 press-connecting blades 9 cut a sheath 10 of the wire 7, and

come into contact with a conductor 11 thereof, as shown in Fig. 8.

Then, the lamp socket 1 is mounted in the socket mounting hole 6, so that the terminal members 2 of the lamp socket 1 are contacted with the press-connecting terminals 8, respectively, and therefore are electrically connected to the wires 7, respectively. When the bulb 3 is attached to the bulb mounting portion 1a of the lamp socket 1, the terminal members 2 are electrically connected to the bulb 3. In this manner, the plurality of lamp sockets 1 are arranged on the lamp unit body 5, and are connected together through the wires 7 to form a lamp unit.

However, since the above related lamp socket 1 does not have any connection portion for the wires, the wires 7 must be installed on the lamp unit body 5. Therefore, each time the configuration of the lamp unit body 5 is changed, the arrangement of the lamp sockets 1, the installation of the wires and so on need to be changed, and therefore there was encountered a problem that the assembling operation was complicated, so that the cost increased.

And besides, since the lamp sockets 1 are attached afterwards, there are occasions when the lamp socket 1 is mounted in a wrong position (In this case, the circuit is not established). In order to prevent such wrong attachment, wrong attachment

prevention ribs 12 of different shapes are provided on the respective lamp sockets as shown in Fig. 10 so that the lamp sockets 1A, 1B and 1C can be distinguished in appearance from one another. Their shapes are thus different from one another, and therefore there was encountered a problem that the number of molds increased, so that the cost increased.

#### SUMMARY OF THE INVENTION

This invention has been made in order to solve the above problems, and an object of the invention is to provide a lamp socket and a lamp socket assembly, in which the lamp socket is so constructed that wires can be connected directly thereto, thus eliminating the need for installing the wires on a lamp unit body, and there is achieved such a general-purpose ability as to meet a wide variety of lamp arrangements.

In order to solve the aforesaid object, the invention is characterized by having the following arrangement.

(1) A lamp socket in which a plurality of the lamp sockets are mounted on a lamp unit body and are connected together through wires, the lamp socket comprising:

a socket body;

a connector housing for accommodating a connector provided to the socket body;

a bulb mounting portion for mounting a lamp provided to the socket body; and

a terminal member provided within the socket body so that the wire, the connector and the lamp can be electrically directly  
5 connected thereto.

(2) The lamp socket according to (1), wherein the socket body is provided with a wire connection portion for an electrical connection of the terminal member to the wire.

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(3) The lamp socket according to (2), wherein

the wire connection portion includes a wire insertion grooves in which the terminal member is mounted; and

the terminal member includes at one end a press-connecting  
15 blade which can bite into a sheath of the wire to electrically connect to a conductor of the wire, at the other end a male tab projecting into an interior of the connector housing for electrically connecting to the connector.

20 (4) The lamp socket according to (3), wherein the bulb is brought in contact with a portion of the terminal member between the press-connecting blade and the male tab.

(5) The lamp socket according to (3), wherein the wire  
25 insertion groove is provided with opposed retaining projections

at an end of an opening thereof, and distance between the opposed retaining projections is smaller than an outer diameter of the wire.

5 (6) A socket assembly comprising:

a lamp unit body; and

a plurality of lamp sockets mounted on the lamp unit body and are connected together through wires, each of the plurality of lamp sockets including,

10 a socket body

a connector housing for accommodating a connector provided to the socket body,

a bulb mounting portion for mounting a lamp provided to the socket body, and

15 a terminal member provided within the socket body so that the wire, the connector and the lamp can be electrically directly connected thereto,

wherein the plurality of lamp sockets are electrically connected together through the wires connected to the terminal  
20 members.

(7) The socket assembly according to (6), wherein the plurality of lamp sockets are connected to one another by the wires of different lengths.

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(8) The socket assembly according to (6), wherein the socket body is provided with a wire connection portion for an electrical connection of the terminal member to the wire.

5 (9) The socket assembly according to (8), wherein  
the wire connection portion includes a wire insertion  
grooves in which the terminal member is mounted; and  
the terminal member includes at one end a press-connecting  
blade which can bite into a sheath of the wire to electrically  
10 connect to a conductor of the wire, at the other end a male  
tab projecting into an interior of the connector housing for  
electrically connecting to the connector.

(10) The socket assembly according to (9), wherein the bulb  
15 is brought in contact with a portion of the terminal member  
between the press-connecting blade and the male tab.

(11) The socket assembly according to (9), wherein the wire  
insertion groove is provided with opposed retaining projections  
20 at an end of an opening thereof, and distance between the opposed  
retaining projections is smaller than an outer diameter of the  
wire.

In the lamp socket of the above construction, the plurality  
25 of lamp sockets can be beforehand connected together through

the wire connection portions by the plurality of wires cut into a plurality of lengths. Therefore, this assembly can be used in a region, having a different lamp arrangement, if the wires have the corresponding lengths, and therefore it can be used  
5 for various kinds of lamp units.

In the lamp socket of the above construction, the wire connecting operation can be effected in a one-touch manner by press-fitting each wire into the wire insertion groove.

In the lamp socket of the above construction, the wire,  
10 mounted in the wire insertion groove, is retained by the retaining projections, and is prevented from withdrawal.

In the socket assembly of the above construction, the plurality of lamp sockets are beforehand connected together by the wires to form the socket assembly, and by doing so, this  
15 assembly can be used for various kinds of lamp unit bodies having different lamp arrangements, and the wire installing operation does not need to be effected at the lamp unit body, and therefore the production cost can be reduced.

In the socket assembly of the above construction, a wrong  
20 attachment can be prevented by the different wire lengths.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded, perspective view showing one preferred embodiment of a lamp socket of the present invention.

25 Fig. 2 is a perspective view of the lamp socket of Fig.

1.

Fig. 3 is a cross-sectional view taken along the line  
A-A of Fig. 2.

Fig. 4 is a plan view of a wire connection portion of  
Fig. 2.

Fig. 5 is a cross-sectional view taken along the line  
B-B of Fig. 4.

Fig. 6 is a plan view showing one preferred embodiment  
of a socket assembly of the invention.

Fig. 7 is a vertical cross-sectional, side-elevational  
view of a related lamp socket.

Fig. 8 is a perspective view showing related  
press-connecting blades for wire connecting purposes.

Fig. 9 is a plan view showing the arrangement of the related  
lamp sockets.

Fig. 10 is a plan view showing related lamp sockets having  
wrong attachment prevention ribs.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

A lamp socket and a socket assembly, provided according  
to one preferred embodiment of the present invention, will now  
be described with reference to Figs. 1 to 6. Those members,  
identical in construction or function to those of the prior  
art structure, will be designated by identical reference  
numerals, respectively, and detailed description thereof will



be omitted.

Fig. 1 is an exploded, perspective view showing one preferred embodiment of the lamp socket of the invention, Fig. 2 is a perspective view of the lamp socket of Fig. 1, Fig. 3 is a cross-sectional view taken along the line A-A of Fig. 2, Fig. 4 is a plan view of a wire connection portion of Fig. 2, Fig. 5 is a cross-sectional view taken along the line B-B of Fig. 4, and Fig. 6 is a plan view showing one preferred embodiment of the socket assembly of the invention.

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As shown in Figs. 1 and 2, the lamp socket 20 according to the invention mainly comprises an upper socket 21, a lower socket 22, and terminal members 23. In the upper socket 21, a bulb mounting portion 25 is formed on an upper side of a cylindrical socket body 24, and the wire connection portion 26 is formed on a side surface of the socket body 24. This wire connection portion 26 has two wire insertion grooves 30 and 30 formed by opposite side walls 27 and 27, projecting from the socket body 24, and a partition wall 28.

As shown in Fig. 5, opposed retaining projections 31, having tapering surfaces 31a, respectively, project , respectively from upper ends of each side wall 27 and the partition wall 28 to partially close the wire insertion groove 30. A dimension  $t$  between these retaining projections 31 and 31 is smaller than an outer diameter  $R$  of a wire 7. Terminal

insertion grooves 32 are formed respectively in inner surfaces of each side wall 27 and the partition wall 28, and are formed in the retaining projections 31 (see Fig. 4).

5 As shown in Figs. 1 and 2, in the lower socket 22, a connector housing 35 for accommodating a power supply connector 13 is formed on a lower side of a disk-like lower socket body 34, and a terminal receiving plate 36 projects from a side surface of this lower socket body. Terminal setting grooves 37, which  
10 are to be disposed in registry with the wire insertion grooves 30, respectively, are formed in the terminal receiving plate 36. A through hole 39, communicating with the interior of the connector housing 35, is formed through a bottom portion of the lower socket body 34, and the terminal setting grooves 37  
15 are formed to extend continuously to this through hole 39 (see Fig. 3).

As shown in Figs. 1 and 5, in the terminal member 23, a male tab 23d, directed downwardly in the drawings, is formed integrally with a wire press-connecting portion 23b (having  
20 a press-connecting blade 23a at one end thereof) through an intermediate bent portion 23c. Each terminal member 23 is mounted in the wire insertion groove 30 in the upper socket 21 and the terminal setting groove 37 in the lower socket 22.

25 Namely, the wire press-connecting portion 23b of each

terminal member is inserted into the corresponding terminal insertion groove 32 from the lower side of the upper socket 21, and then the upper socket 21 is attached to the lower socket 22, and by doing so, the lamp socket 20 is assembled as shown in Fig. 2. In this lamp socket 20, the wire connection portion 26 and the terminal receiving plate 36 project respectively from the side surfaces of the upper and lower socket bodies 24 and 34.

As shown in Fig. 3, the bent portions 23c of the terminal members 23 are set in the terminal setting grooves 37, respectively, and the male tabs 23d project into the interior of the connector housing 35 through the through hole 39. Then, when a bulb 3 is attached to the bulb mounting portion 25 of the upper socket 21, a connection portion 3a of the bulb 3 is contacted with the terminal members 23 and 23 to be electrically connected thereto. When the power supply connector 13 is accommodated in the connector housing 35, the power supply connector 13 is electrically connected to the male tabs 23d of the terminal members 23.

When the wire 7 is press-fitted into the wire insertion groove 30 from the upper side as shown in Fig. 5, the press-connecting blade 23a of the terminal member 23 bites into a sheath 10, and comes into contact with a conductor 11, and therefore is electrically connected to the terminal member 23.

The wire 7 is forced through the gap between the opposed retaining projections 31, and is disposed on the lower sides of these retaining projections, and therefore is prevented from withdrawal.

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As described above, in the socket assembly 43 of this embodiment, the wire connection portion 26 is provided at each lamp socket 20, and therefore the lamp sockets 20 can be beforehand connected together by the wires.

10 For example, three (this number is arbitrary) lamp sockets 20 are beforehand connected together by the wires 7 as shown in Fig. 6, and by doing so, this assembly can be used in a region, having a different lamp arrangement, if the wires 7 have the corresponding lengths, and therefore it can be used for various  
15 kinds of lamp units. The length of the wires 7 at an installation side A is made different from the length of the wires 7 at an installation side B ( $A > B$ ) so that those regions to be connected together by the wires of the longer installation side A can be not connected together by the wires of the shorter  
20 installation side B. By doing so, a wrong attachment can be prevented.

The present invention is not limited to the above embodiment, and other embodiments of the invention can be  
25 provided. For example, although the wire connection portion

26 has such a construction that the terminal members 23, each having the press-connecting blade 23a, are mounted respectively in the wire insertion grooves 30, the invention is not limited to this construction, and for example there can  
5 be used a construction in which a terminal member 23 is compressively pressed to be connected to the wire 7.

As described above in detail, in the lamp socket of the present invention, the wire connection portion for electrical  
10 connection to the terminal members within the connector housing is formed integrally with the lamp socket.

Therefore, the plurality of lamp sockets can be beforehand connected together through the wire connection portions by the wires, and this assembly can be used in a region, having a  
15 different lamp arrangement. Therefore, the wire installing operation does not need to be effected at the lamp unit body, and therefore the production cost can be reduced, and besides the excellent general-purpose ability is achieved, and a wrong attachment can be eliminated.

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In the lamp socket, the wire connection portion includes the wire insertion grooves, and has the terminal members mounted respectively in the wire insertion grooves, and the terminal member has at one end the press-connecting blade which can bite  
25 into the sheath of the wire to contact the conductor of the

wire, and also has at the other end the male tab projecting into the interior of the connector housing.

Therefore, the wire connecting operation can be effected in a one-touch manner by press-fitting each wire into the wire insertion groove. Therefore, the efficiency of the assembling operation can be enhanced.

In the lamp socket, the opposed retaining projections are formed at the end of the opening of the wire insertion groove, and the distance between the opposed retaining projections is smaller than the outer diameter of the wire.

Therefore, the wire, mounted in the wire insertion groove, is retained by the retaining projections, and is prevented from withdrawal. Therefore, there can be obtained the lamp socket of high reliability.

In the socket assembly of the present invention, the wire connection portion for electrical connection to the terminal members within the connector housing is formed integrally with the lamp socket, and there are used the plurality of lamp sockets which are connected together by the wires connected respectively to the wire insertion grooves in the lamp sockets.

Therefore, the plurality of lamp sockets are beforehand connected together by the wires to form the socket assembly, and by doing so, this assembly can be used for various kinds

of lamp unit bodies having different lamp arrangements, and the wire installing operation does not need to be effected at the lamp unit body, and therefore the production cost can be reduced, and a wrong attachment can be eliminated.

5        In the above socket assembly, the lamp sockets are connected to one another by the wires of different lengths.

         Therefore, a wrong attachment can be positively prevented by the different wire lengths.

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